CLAIMS

What is claimed is:

1. An orthogonal frequency division multiplexing (OFDM)-based synchronization detection apparatus, comprising:

m registers which store input data;

m shifters which shift outputs of the registers by as many as an exponent of a 2^n-level quantized correlation coefficient for synchronization detection (n is an integer not less than 0);

an adder which adds outputs of the shifters; and

a peak detector which detects a peak value among the outputs of the adder.

2. The apparatus of claim 1, wherein the 2^n-level quantized correlation coefficient is obtained by proportionally scaling up a correlation coefficient using 2^n and approximating the scaled-up correlation coefficient to $+/-2^i$ (i = 0, 1, ..., n).

3. The apparatus of claim 2, wherein in the scaling up the correlation coefficient, a correlation coefficient c*(m) is normalized using an equation $x = \frac{2^n c^*(m)}{\max c^*(m)}$.

4. The apparatus of claim 3, wherein in the approximating the scaled-up correlation coefficient, the normalized value x is approximated to a predetermined value Q_L and

$$Q_L[x] = \begin{cases} 2^{\lfloor \log_2 x \rfloor}, & x > 0 \\ -2^{\lfloor \log_2 (-x) \rfloor}, & x < 0 \\ 0, & x = 0 \end{cases}$$ (where $\lfloor \log_2 x \rfloor$ indicates an integer closest to $\log_2 x$).

5. An OFDM-based synchronization detection method, comprising:

quantizing correlation coefficients for synchronization detection into 2^n-level quantized correlation coefficients (n is an integer not less than 0);

shifting input data using the 2^n-level quantized correlation coefficients to determine shifting results; and

detecting synchronization using the shifting results.

6. The method of claim 5, wherein in the shifting the input data, the input data is shifted by a predetermined number of bits, which is the exponent of the 2n -level quantized correlation coefficient.

7. The method of claim 5, wherein the quantizing a correlation coefficient comprises:

scaling up the correlation coefficient using 2^n; and

approximating the scaled-up correlation coefficient to +/- 2^i (I = 0, 1, ..., n).

8. The method of claim 7, wherein in the scaling up the correlation coefficient, a correlation coefficient c*(m) is normalized using an equation $x = \frac{2^n c^*(m)}{\max c^*(m)}$.

9. The method of claim 8, wherein in approximating the scaled-up correlation coefficient, the normalized value x is approximated to a predetermined value Q_L and

$$Q_L[x] = \begin{cases} 2^{\lfloor \log_2 x \rfloor}, x > 0 \\ -2^{\lfloor \log_2 (-x) \rfloor}, x < 0 \\ 0, x = 0 \end{cases}$$ (where $\lfloor \log_2 x \rfloor$ indicates an integer closest to $\log_2 x$).

10. The method of claim 5, wherein the detecting the synchronization comprises:

adding the shifting results to produce adding results; and

detecting a peak value among the adding results.

11. An orthogonal frequency division multiplexing (OFDM)-based synchronization detection apparatus, comprising:

an input register storing data;

a shifter wherein data from the input register is shifted based on an exponent of a quantized correlation coefficient;

an adder wherein the shifted data is summed; and

a peak detector wherein a peak value is determined from the summed shifted output for synchronization detection.

12. The apparatus of claim 11, further comprising

a 2^n level quantizer, wherein a standard correlation coefficient is quantized into a 2^n level, wherein the quantized correlation coefficient is determined.

13. The apparatus of claim 12, wherein the 2^n level quantizer approximates the standard correlation coefficient by scaling the correlation coefficient, c*(m), into discrete levels by rounding normalized correlation coefficients to the nearest whole integer represented by 2^n.

14. The apparatus of claim 12, wherein a table of quantized correlation coefficients is stored to use in shifting the data left by the number of bits in the exponent of the corresponding quantized correlation coefficient.

15. The apparatus of claim 12, wherein the maximum quantization level is greater than or equal to 2^2.

16. The apparatus of claim 12, wherein the input register further comprises individual registers that each store a sample of the data.

17. The apparatus of claim 16, wherein the data samples move to the next register upon a clock cycle.

18. The apparatus of claim 17, wherein the data samples are output to the shifter after sixteen clock cycles.

19. A method of synchronization detection in an orthogonal frequency division multiplexing (OFDM) receiver comprising:

storing input data in a register;

calculating a quantized correlation coefficient from a standard correlation coefficient based on 2^n level;

shifting the input data using a number of bits corresponding to an exponent of the quantized correlation coefficient;

adding the shifted input data; and

scanning the adding the shifted input data for a peak value wherein synchronization is detected.

20. The method of claim 19, wherein the calculating the quantized correlation coefficient includes

normalizing a standard correlation coefficient; and

rounding the normalized standard correlation coefficient to the nearest whole integer represented by 2^n.